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## Scaling housing interventions for wood-burning stoves worldwide

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Environment and Health –  
Bridging South, North, East and West

Conference of ISEE, ISES and ISIAQ  
Basel, Switzerland 19 – 23 August 2013



# SCALLING HOUSE INTERVENTIONS FOR WOOD-BURNING STOVES WORLDWIDE

*HOUSEHOLD AIR POLLUTION AND RISK ASSESSMENT  
ENVIRONMENT AND HEALTH, BASEL, AUGUST 2013*

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MINISTÉRIO DA EDUCAÇÃO E CIÊNCIA

# Domestic biomass combustion worldwide

*We know that biomass burning can be carbon neutral when using dry local biomass performing lightning from top to down and operating the stove with primary and secondary air to burn volatile organic compounds*



*A global issue...*



*Human health*  
*Epidemiological studies*  
*Associated to human exposure*  
*to air pollutants*

*Health of the globe*

- *Desforestation*
- *Energy consumption*
- *Air pollution/ climate change*



# Causes of inefficient biomass combustion

(large increase on solid-fuel burning during the last years)

Impacting on biodiversity

Low quality solid-fuels

Air pollution due to inadequate operation

Indoor comfort

Impacts on human health, there is a global issue of **climate change**



**Running out of time – the 1990 targets at last**  
Emission levels of carbon dioxide from the transport sector have levelled off, after the sharp reductions that followed the economic crisis in 2008.  
► Page 6

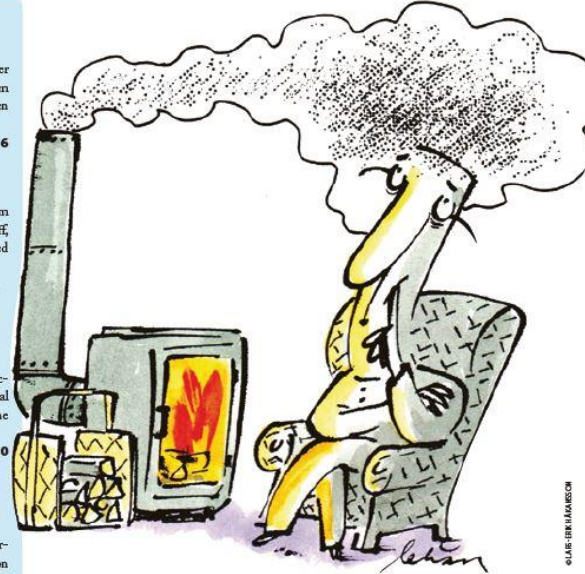
**Progress too slow**  
Emission levels of carbon dioxide from the transport sector have levelled off, after the sharp reductions that followed the economic crisis in 2008.  
► Page 8

**Revising EU air pollution policy**  
Significant additional emission reductions and accompanying environmental improvements can be achieved in the EU over the next 10-15 years.  
► Page 10

**Nitrogen overload still harms ecosystems**  
Two-thirds of EU ecosystems are currently exposed to more nitrogen deposition than they can cope with and one-tenth is receiving too much acid fallout.  
► Page 14

**Scope for reducing ammonia emissions**  
By applying already known techniques and agricultural practices, the EU could reduce agricultural emissions of ammonia by more than 30 per cent.  
► Page 16

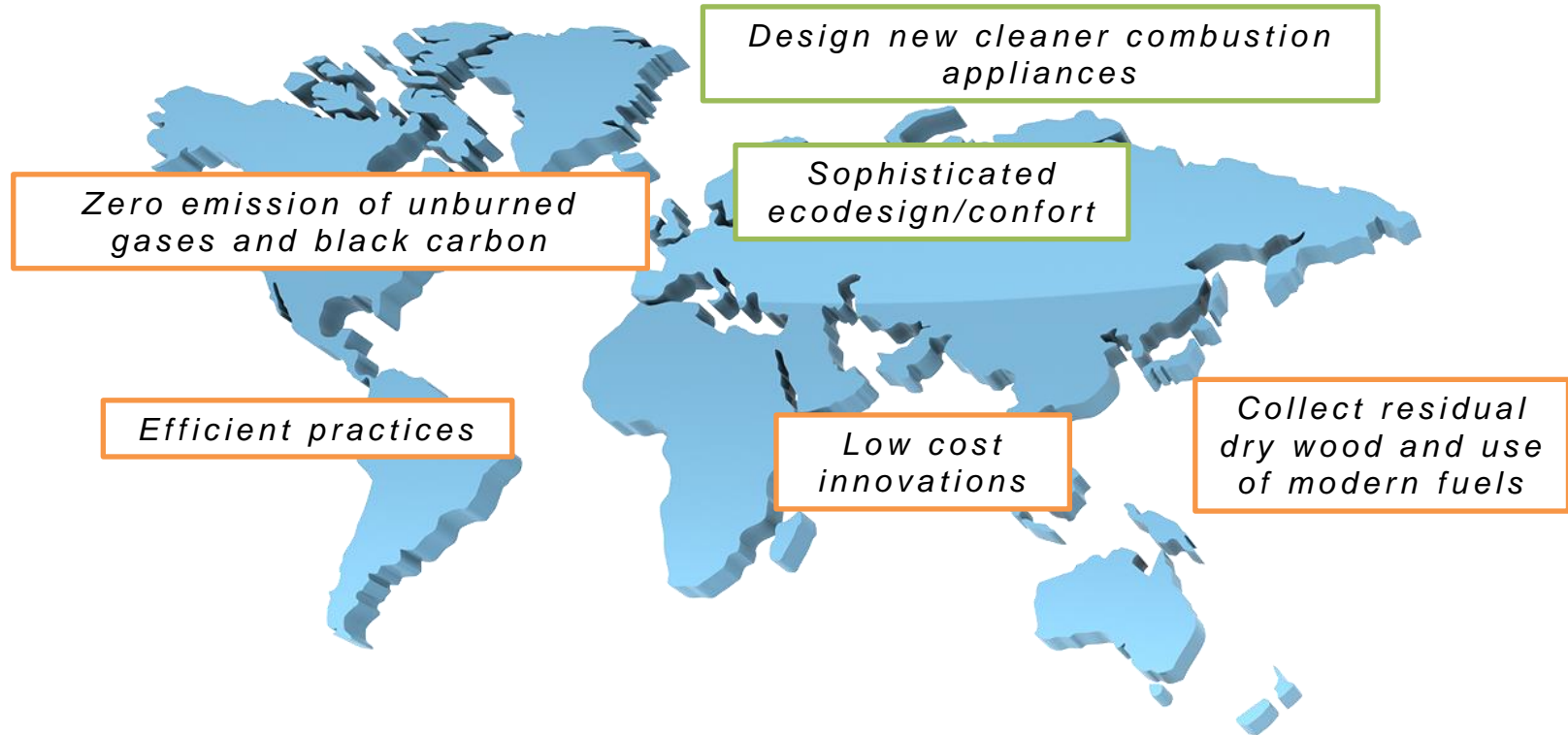
**Tailwind for wind**  
Wind power is coming of age. It supplies one-fourth of the world's electricity and



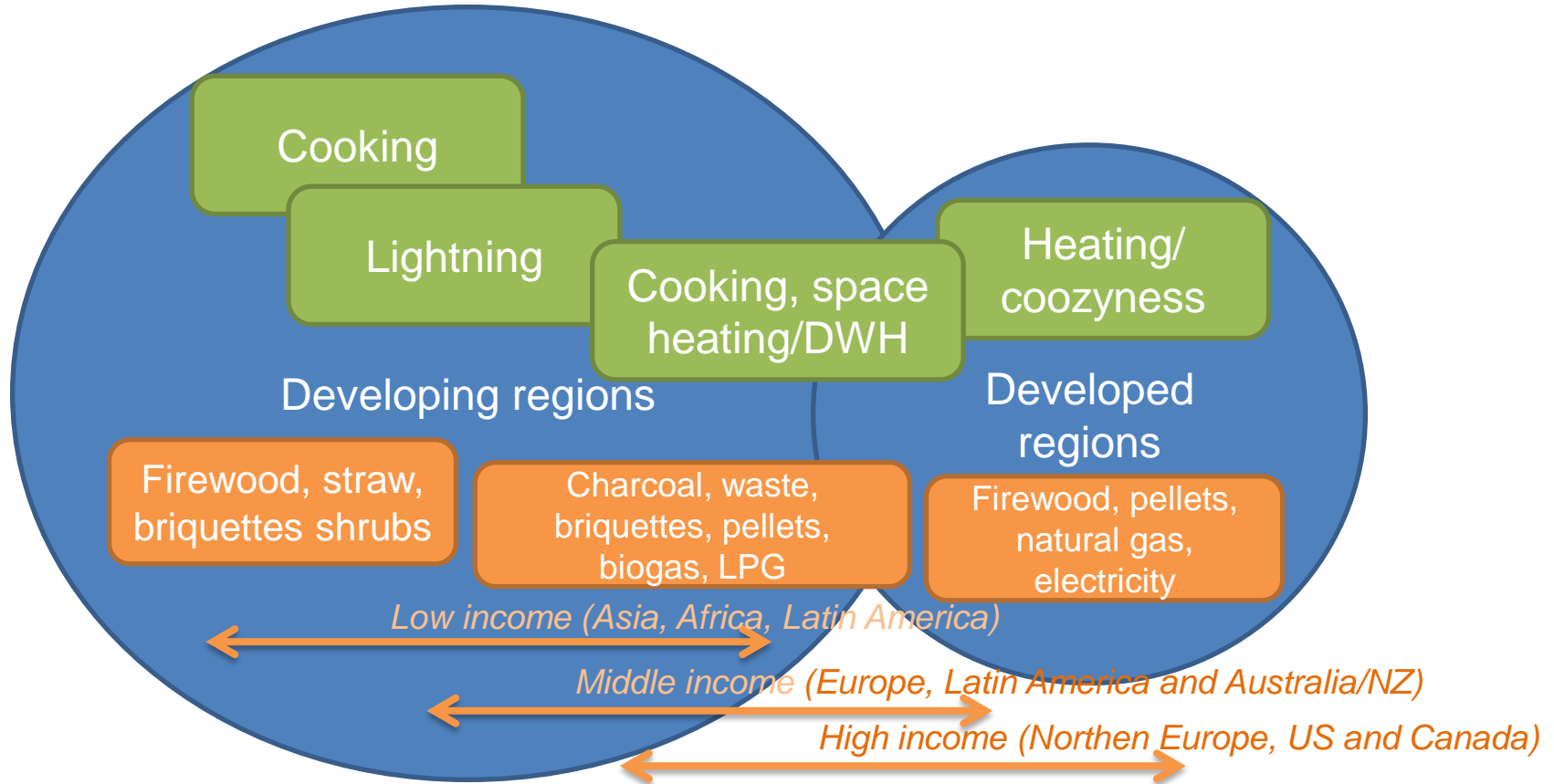
## Small chimneys – big emissions

The Danish Government and the European Commission have separately presented proposals for emission standards for new boilers and stoves. But to achieve noticeable near-term air pollution reductions it is essential to combine such standards with measures for existing installations.

# Appropriate domestic biomass use: *What are the potential measures for GHGs mitigation?*



# Practices and solid fuels worldwide



# Overheating in low energy houses

## *new biomass stoves and EU labelling*

Heating requirement (kW) for at sitting room at 50 m<sup>2</sup>



Outdoor temperature (kW)	BR 1961	BR 1977	BR 1985	BR 1995	BR 2006	BR 2010
10 °C	2,1	1,9	1,3	1,3	1,2	1,0
5 °C	3,1	2,8	1,9	1,9	1,8	1,5
0 °C	4,2	3,7	2,5	2,6	2,3	2,0
-5 °C	5,2	4,7	3,1	3,2	2,9	2,5
-10 °C	6,2	5,6	3,8	3,8	3,5	3,0

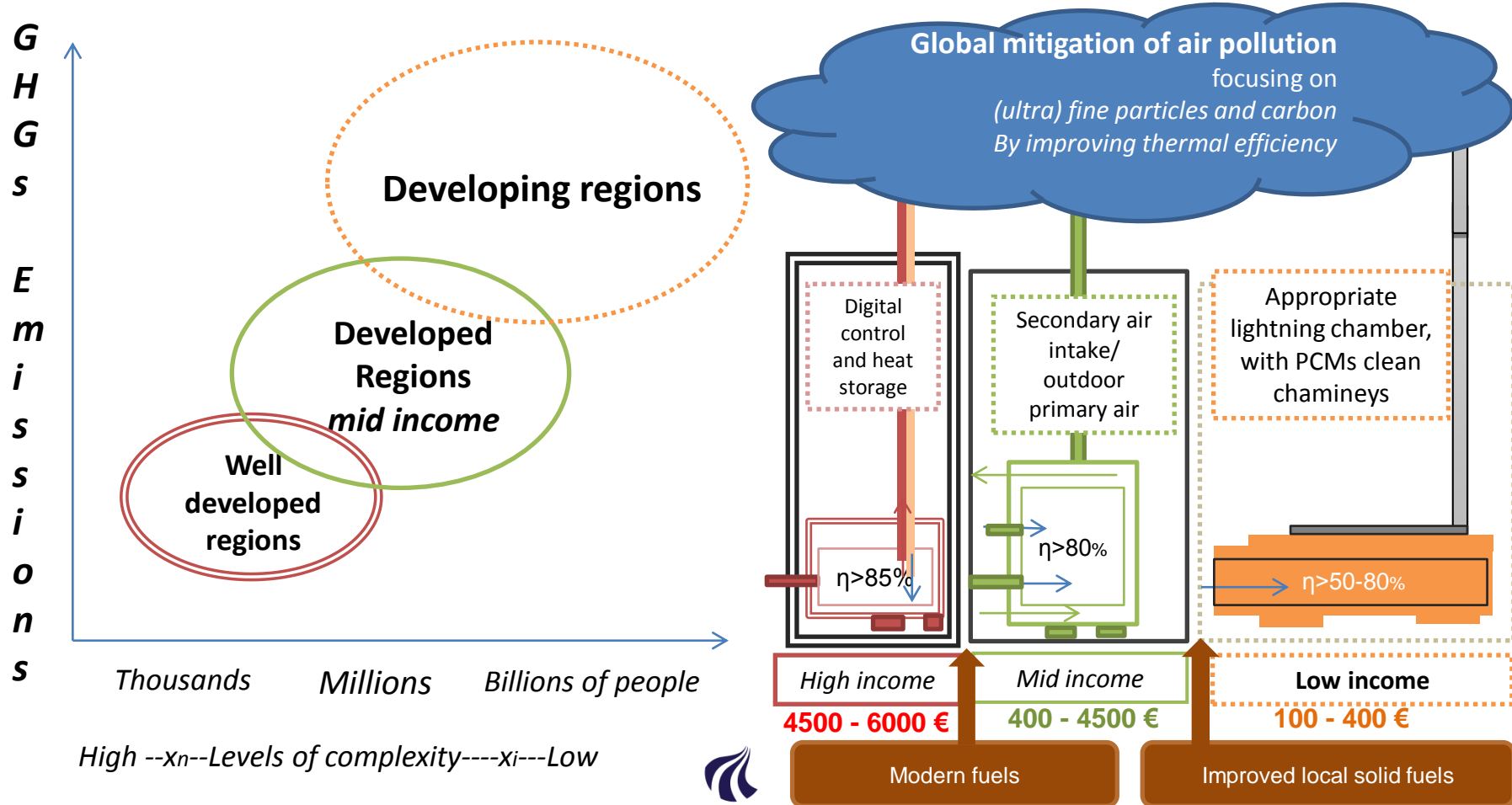


*Ole M. Jensen et al. Danish Building Research Institute, 2012*





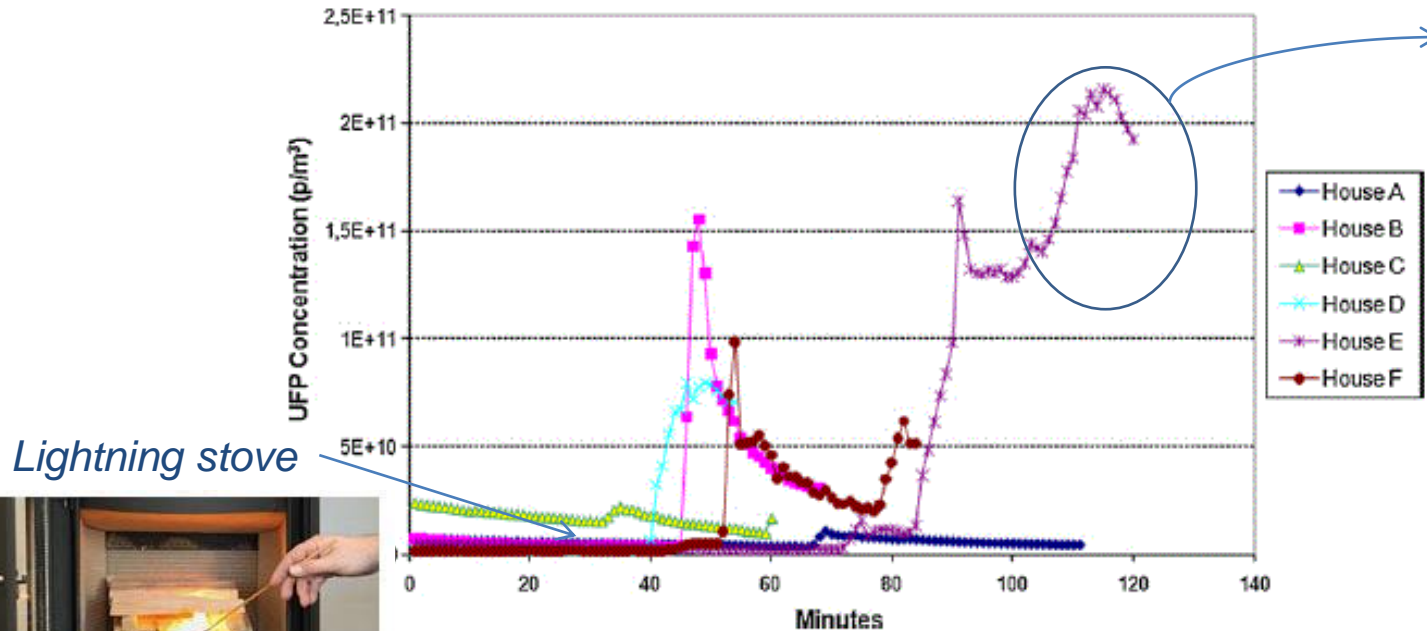
# Magnitude of interventions in dwellings?





# Indoor climate measurements in low energy houses

## *guidance to scaling household interventions*



*Operating manually*



*Energy savings  
Fine particle mitigation*

*Afshari, A. et al., 2011*



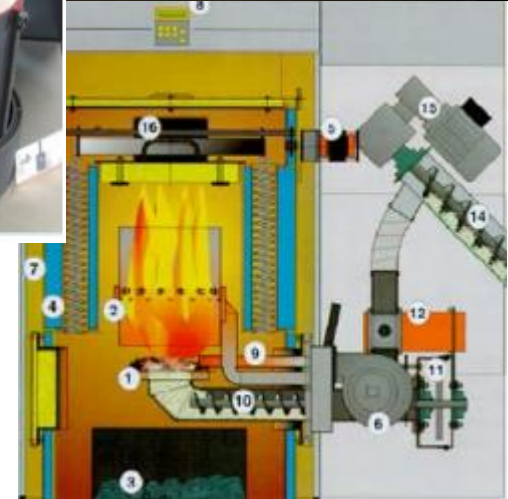
# Testing efficient cooking stoves (Latin America)



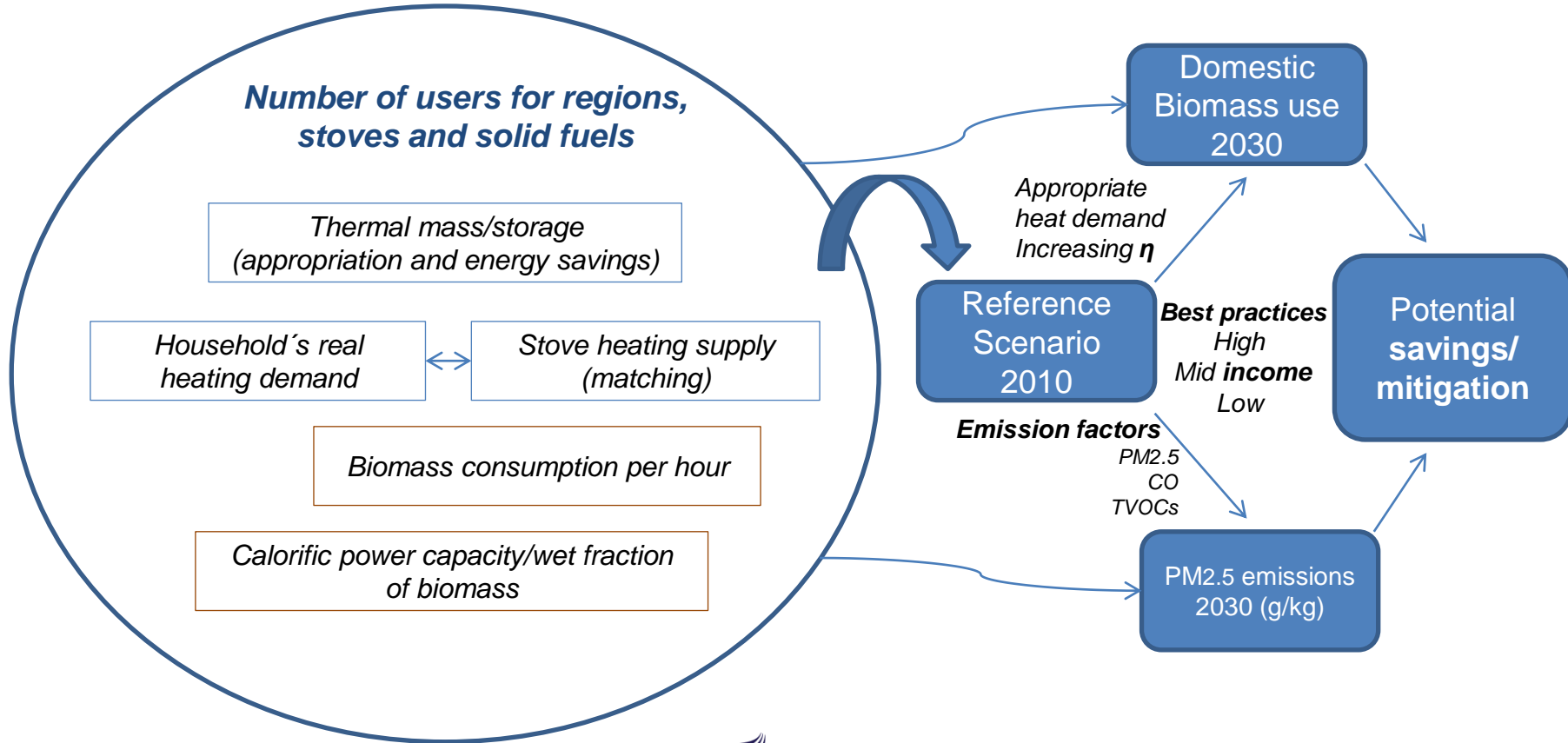
*Improved cooking stove Nina (Peru) have a thermal efficiency of 30% and new efficient wood cooking stove IDER (Brazil) saves 40% of solid-fuels*



# Cataloging stoves in Latin America and Europe



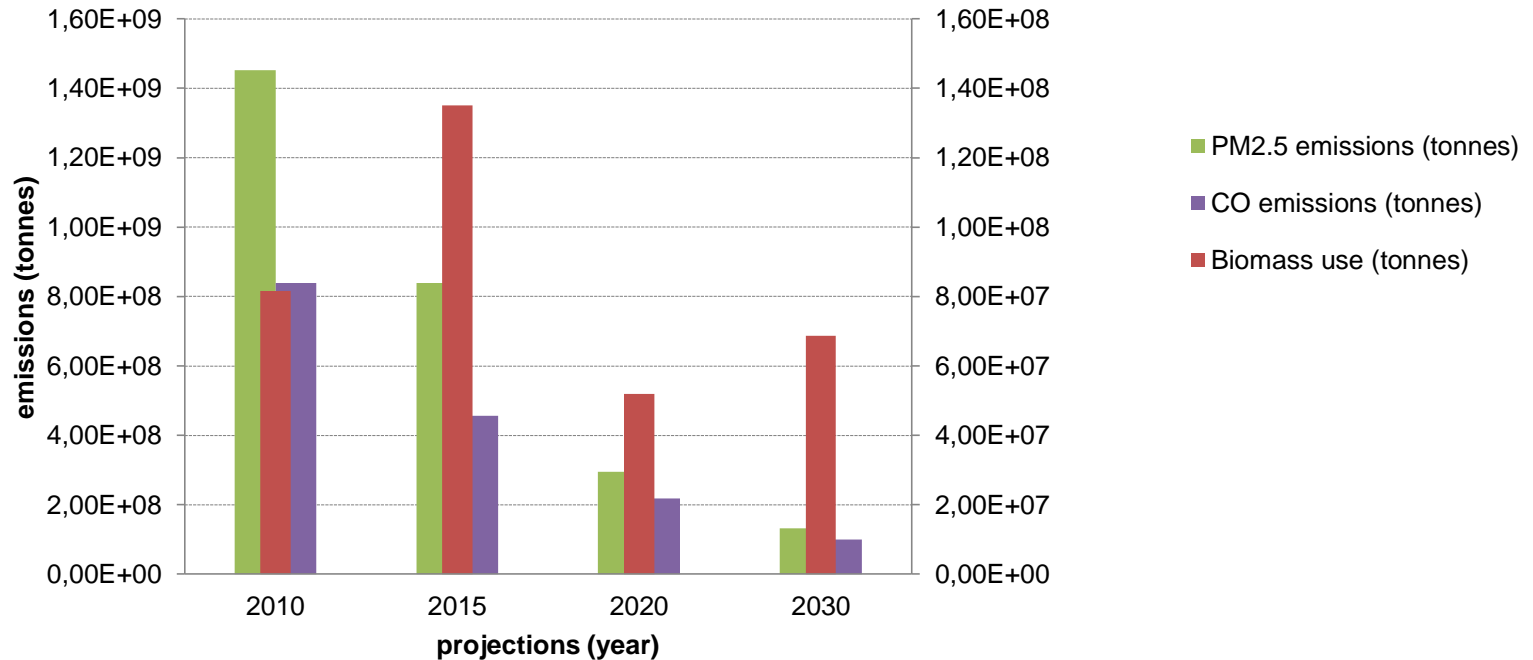
# Methodology for modelling mitigation measures impact





# Modelling/estimations energy savings and PM<sub>2.5</sub> emissions EU27 *(work in progress...)*

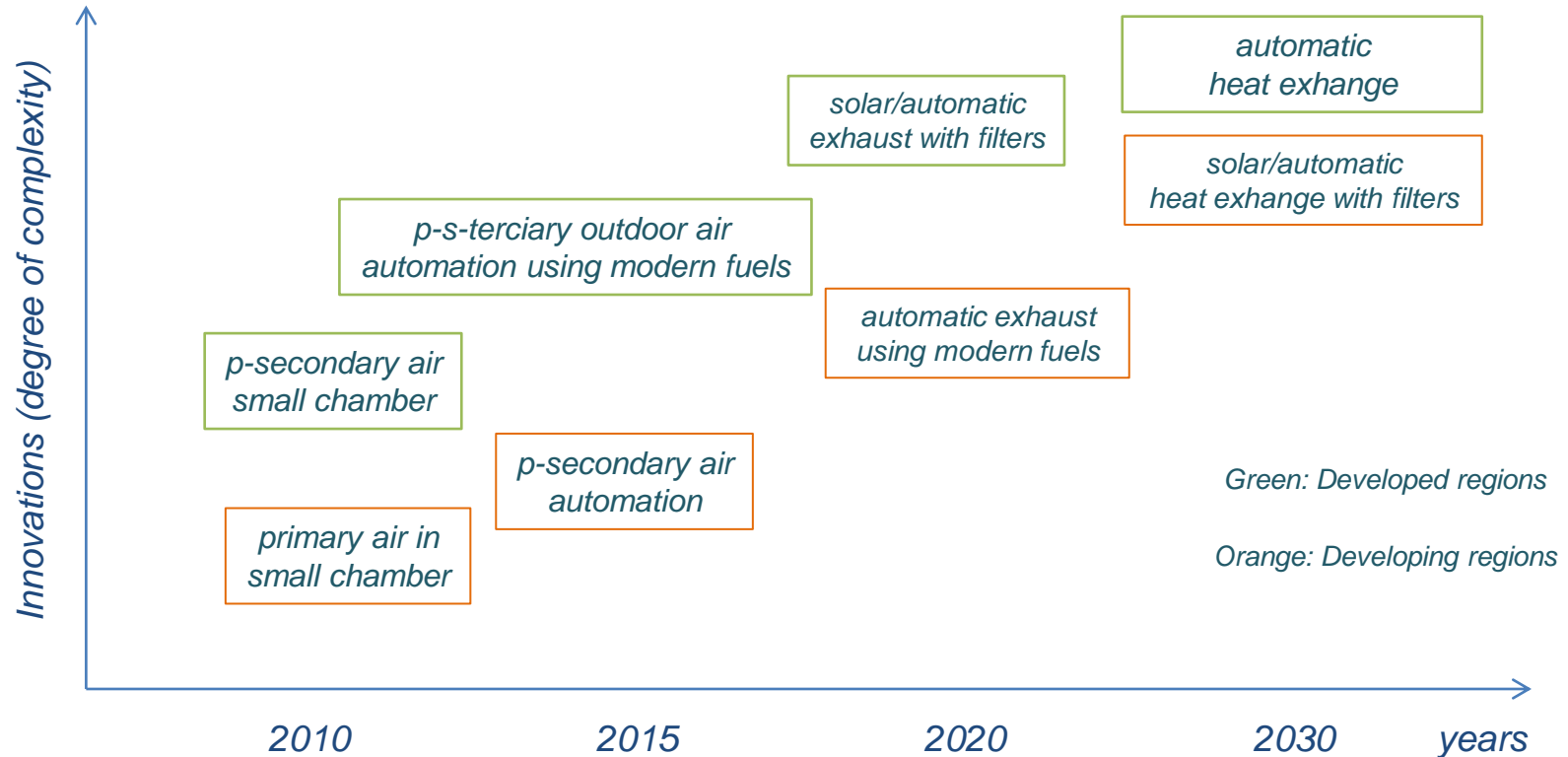
## Scenario A: stable



Modelling/estimations energy savings and PM<sub>2.5</sub> emissions in Latin America (*work in progress...*)??

# Scale up-grading biomass stoves until 2030

## *big changes with low cost innovations?*







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## QUESTIONS?

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